

STATUS REVIEW OF Claytonia lanceolata var. flava

U.S. FOREST SERVICE - REGION 1

BEAVERHEAD, DEERLODGE AND GALLATIN NATIONAL FORESTS

MONTANA

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Order No. 43-0398-8-0347

January 1989

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I. SPECIES INFORMATION

A. CLASSIFICATION

1. SCIENTIFIC NAME: Claytonia lanceolata Pursh var. flava (A. Nels.) C.L. Hitchc. (Hitchcock *et al.* 1969).
2. SYNONYMS: C. aurea A. Nelson (1900; not of Kuntze in 1891); C. flava A. Nelson (1926).
3. COMMON NAME: Yellow springbeauty.
4. FAMILY: Portulacaceae (Purslane family).
5. GENUS: According to Davis (1966), the genus Claytonia consists of 19 or 20 species, 15 of which occur in North America.
6. SPECIES/VARIETY: According to the taxonomic treatment by Hitchcock *et al.* (1969), Claytonia lanceolata is a wide-ranging, variable species consisting of four varieties: chrysanthia, flava, multiscapa, and typical lanceolata. The latter variety has the widest geographic distribution, occurring throughout western North America from British Columbia to southern California, and east to Alberta and New Mexico. The other three varieties are restricted to smaller geographic areas within the range of var. lanceolata.
7. SYSTEMATIC STATUS: As part of this assessment of the endangerment status of C. lanceolata var. flava for the U.S. Forest Service and the U.S. Fish and Wildlife Service, detailed studies of its systematic status are also being conducted. These studies have included an analysis of the extent of genetic differentiation between vars. flava and lanceolata (using electrophoresis), as well as morphological studies of living plants in the field. The results of the electrophoretic study (conducted by Dr. Douglas Soltis' laboratory, Department of Botany, Washington State University) indicate that the two varieties are well differentiated genetically, apparently at the species level (Appendix A, p. 37). The morphological data also support taxonomic treatment of var. flava as a distinct species. These results are to be published in the systematic literature once all analyses are complete. The final conclusions will be provided to the U.S. Forest Service.

B. PRESENT LEGAL OR OTHER FORMAL STATUS**1. FEDERAL STATUS**

a. U.S. FISH AND WILDLIFE SERVICE: Claytonia lanceolata var. flava is currently included in Category 2 of the U.S. Fish and Wildlife Service Notice of Review (U.S. Department of Interior 1985), under consideration for federal listing as a threatened taxon. Category 2 taxa are those "...for which information now in possession of the Service indicates that proposing to list them as endangered or threatened species is possibly appropriate, but for which substantial data on biological vulnerability and threat(s) are not currently known or on file to support the immediate preparation of rules" (= federal candidate taxa).

b. U.S. FOREST SERVICE: Claytonia lanceolata var. flava is currently included on the list of sensitive plant species for Region 1 (Northern Region) of the U.S. Forest Service. Agency objectives and policy in the 1984 Forest Service Manual provide for the management and protection of sensitive species (Section 2670.32). Under these guidelines, the U.S. Forest Service is to "(a)void or minimize impacts to species whose viability has been identified as a concern" (2670.32.3), and is to "(e)stablish objectives for Federal candidate species, in cooperation with the FWS...and the states" (2670.32.5).

2. STATE: Claytonia lanceolata var. flava is currently listed by the Montana Natural Heritage Program (Shelly 1988) as "critically imperiled in the state" (state rank = S1). It was recommended for listing as "threatened" (any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range in the state) by the Montana Rare Plant Project (Lesica *et al.* 1984).

These state ranks do not currently provide any direct legal protection for C. lanceolata var. flava. Through its inclusion on the Region 1 sensitive plant list, the taxon has legal protection under U.S. Forest Service agency policies (W. Ruediger, pers. comm.).

C. DESCRIPTION

1. **GENERAL NONTECHNICAL DESCRIPTION:** Claytonia lanceolata var. flava is a small perennial herb, with stems that arise from deep-seated corms. The aboveground portions of the stems are about 2-6 inches tall. The middle of each stem bears two opposite leaves, which are much longer (ca. 2-4 inches long) than wide (ca. 1/4-1/2 inch wide). The tops of the stems bear from 2 to 12 or more flowers; the results of current systematic studies indicate that the petals may be either yellow or white. The five petals are rounded at the tips, and narrow to a small base. In Montana, the plants are generally in bloom from mid-May to mid-June, although at the highest elevations some flowers may persist into early July. See Section V, p. 32, for color photos of plants and habitat.
2. **TECHNICAL DESCRIPTION:** Glabrous perennial from a usually rather deep-seated, semiglobose corm 5-20 (40) mm. in diameter; basal leaves (often lacking in flowering plants) 1 or 2, narrowly oblanceolate, 2-10 mm. broad, up to about 10 cm. long (including the subterranean portion of the slender petiole); flowering stems 1-several, up to about 12 cm. tall (not including the subterranean portion or raceme), bearing (from slightly below to above midlength) 2 opposite, sessile or subsessile, narrowly lanceolate leaves that are commonly about 3-10 (12) mm. wide and 2-6 cm. long; racemes loosely (2) 3- to 12-flowered, often secund, reduced-bracteate below; pedicels stout to slender, 1-5 cm. long, usually arched-recurved in fruit; sepals 4-7 mm. long; corolla deep yellow or white, the petals 7-12 mm. long; stamens 5, basally adnate to the petals; styles 3; capsule ovoid, firm-walled, about 4 mm. long; seeds (1-2) 3-6, black and shining, 2-2.5 mm. long, very indistinctly warty-papillate, with a fairly evident strophiole (adapted from Hitchcock *et al.* 1964).
3. **LOCAL FIELD CHARACTERS:** The two varieties of Claytonia lanceolata that occur in Montana (vars. flava and lanceolata) both possess deep-seated, roundish corms. However, recent systematic studies indicate that the two are distinguishable by leaf morphology. Variety flava has leaves which are much longer than wide, being lanceolate (often narrowly so) in shape. Variety lanceolata has leaves that are typically shorter and broader. In addition, var. flava can have either yellow or white flowers, with petals that are most often

rounded at the tips. Variety lanceolata possesses white petals that are frequently tinged and/or lined with pink, and that are often notched at the tips.

D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** Claytonia lanceolata var. flava is a regional endemic, known from east-central Idaho (Fremont County), northwestern Wyoming (Fremont County), and southwestern Montana (Beaverhead, Deerlodge, Gallatin, Jefferson, and Silver Bow counties). It is known to occur on the Beaverhead, Deerlodge, and Gallatin National Forests in Montana (U.S. Forest Service, Region 1), and on the Shoshone National Forest in Wyoming (U.S. Forest Service, Region 2). The distribution of C. lanceolata var. flava in Montana is shown in Figure 1, p. 5. The exact locations are shown on the maps provided in Section IV, pp. 27-31.
2. **CURRENT SITES (MONTANA):** Claytonia lanceolata var. flava is recently documented (1988) from five sites. All of these sites occur wholly or partially on U.S. Forest Service lands. The locations of these sites, including the legal descriptions, latitude and longitude, elevations, and USGS topographic quadrangle names, are provided in Table 1, p. 6. Field surveys were conducted by the author and Peter Lesica (Division of Biological Sciences, University of Montana) on 8 May, 17-18 May, 25-27 May, 4 June, and 10 June, 1988. Field surveys were also conducted by Lisa Schassberger (Montana Natural Heritage Program) on 5-9 June, 1988. Assistance with field surveys was provided by Ken Scow (WESTECH, Helena) and Jan Nixon (Bozeman).

Throughout this report, the three-digit occurrence numbers are indicated in parentheses after the site names; these correspond to the occurrence numbers provided in the tables and computer print-outs.

3. **HISTORICAL SITES:** It is believed that the surveys at the Lockhart Meadows (001) and French Creek (002) sites represent the rediscovery of two historical collections, in 1966 ("Champion Pass") and 1911 ("Anaconda"), respectively. The original collection from the Champion Pass area was made by F. Trask (377, MONT); the location on this specimen was given as "(n)eар Champion Pass on Boulder Road, 11 mi. SE. of Deer Lodge." This vicinity was surveyed in detail, but no highly

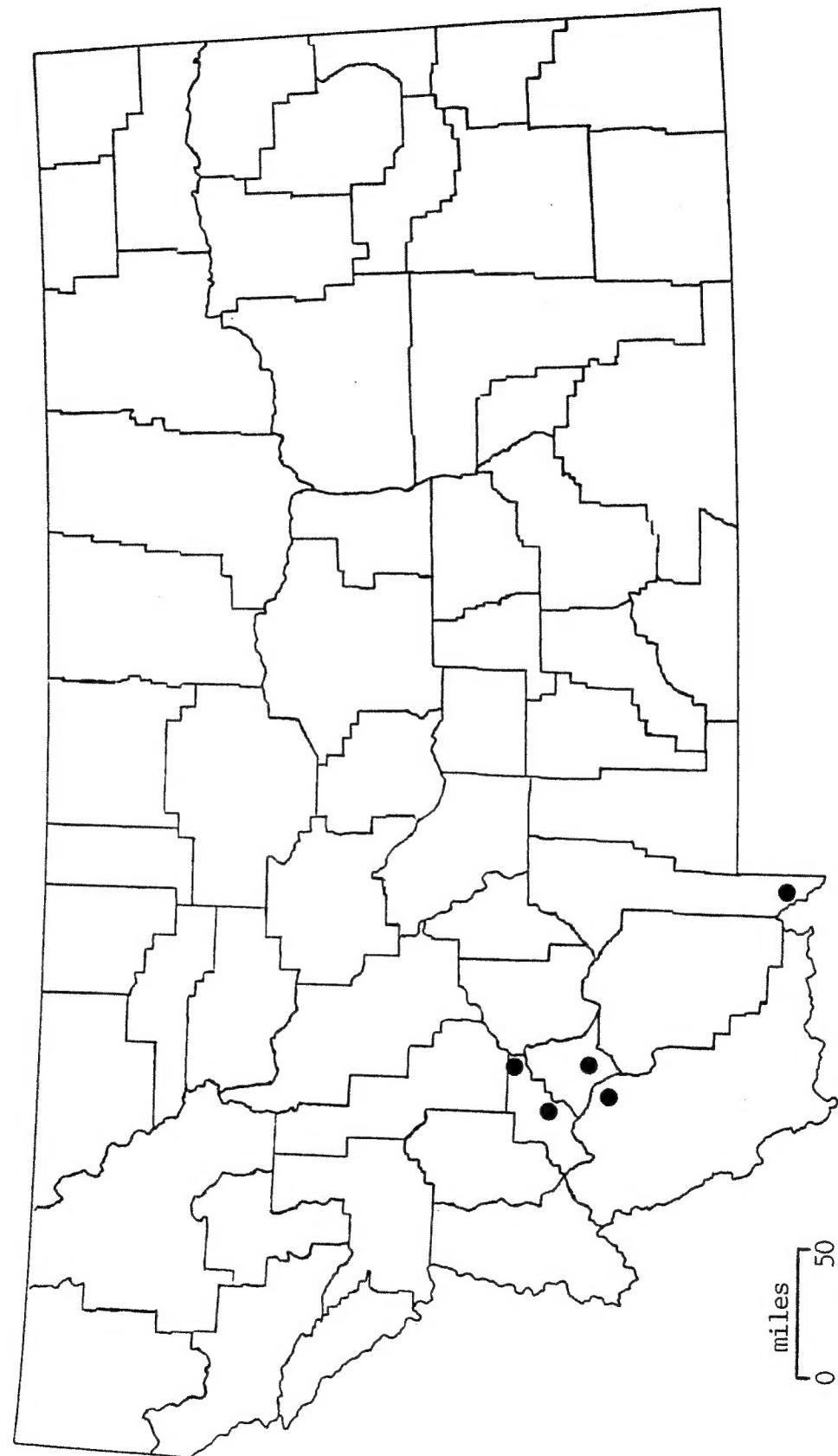


Figure 1. Distribution of Claytonia lanceolata var. flava in Montana.

TABLE 1. Claytonia lanceolata var. flava locations wholly or partially occurring on U.S. Forest Service lands, Montana.

Occurrence number: 001
 Site name: LOCKHART MEADOWS (CHAMPION PASS)
 COUNTY: JEFFERSON
 Township & Range: 006N008W Sections: 35 NE $\frac{1}{4}$; 25 E $\frac{1}{4}$; 26 SE $\frac{1}{4}$; 36
 006N007W Sections: 30 NW $\frac{1}{4}$; 31 SW $\frac{1}{4}$
 005N008W Sections: 1; 2 NE $\frac{1}{4}$ NE $\frac{1}{4}$
 Latitude: 461409 Longitude: 1123325 Elevation: 6550
 USGS Quad: BUTTE NORTH (15')
 Location: POWDERHORN CREEK AND LOCKHART MEADOWS, UPPER BOULDER RIVER DRAINAGE, 2.6-3.0 AIR MILES ENE TO SOUTHEAST OF CHAMPION PASS.

Occurrence number: 002
 Site name: FRENCH CREEK (ANACONDA)
 COUNTY: DEER LODGE
 Township & Range: 002N012W Sections: 12 NW $\frac{1}{4}$; 1; 2; 11
 003N011W Section: 31
 003N012W Sections: 25; 35; 36
 Latitude: 455641 Longitude: 1130225 Elevation: 6500
 USGS Quad: LINCOLN GULCH
 Location: FRENCH AND CALIFORNIA CREEKS, MT. HAGGIN WILDLIFE MANAGEMENT AREA, ALONG HWY. 274 CA. 17.5-20 MILES SSW OF ANACONDA.

Occurrence number: 003
 Site name: VIPOND PARK
 COUNTY: BEAVERHEAD
 Township & Range: 002S011W Sections: 2; 1 N $\frac{1}{4}$; 11 W $\frac{1}{4}$, S2SE $\frac{1}{4}$; 12 SW $\frac{1}{4}$ SW $\frac{1}{4}$; 13 NW $\frac{1}{4}$; 14 N $\frac{1}{4}$
 001S011W Section: 35 SE $\frac{1}{4}$
 Latitude: 454154 Longitude: 1125508 Elevation: 8200
 USGS Quad: VIPOND PARK (15)
 Location: PIONEER MOUNTAINS, CA. 8 MILES SOUTH OF DEWEY, UP QUARTZ HILL GULCH RD. TO VIPOND PARK; EAST OF ROAD.

Occurrence number: 004
 Site name: HEBGEN LAKE
 COUNTY: GALLATIN
 Township & Range: 013S004E Sections: 3 SW $\frac{1}{4}$; 4 SE $\frac{1}{4}$; 9 NE $\frac{1}{4}$; 10 N $\frac{1}{4}$; 14 NW $\frac{1}{4}$; 15; 23 NW $\frac{1}{4}$
 Latitude: 444338 Longitude: 1111359 Elevation: 6550
 USGS Quad: MADISON ARM
 Location: SOUTH OF HEBGEN LAKE, WEST SIDE OF MADISON VALLEY, CA. 0.5-3 AIR MILES SOUTH OF LONESOMEHURST CAMPGROUNDS, EAST AND SOUTH OF HEBGEN LAKE RD. (#167).

TABLE 1. (cont.).

Occurrence number: 005

Site name: BURTON PARK

COUNTY: SILVER BOW

Township & Range: 001N008W Sections: 27 SW $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ NW $\frac{1}{4}$, E $\frac{1}{4}$ SE $\frac{1}{4}$; 20 E $\frac{1}{4}$ SE $\frac{1}{4}$; 22 S $\frac{1}{4}$ SW $\frac{1}{4}$;
26 SW $\frac{1}{4}$ SW $\frac{1}{4}$; 35 NW $\frac{1}{4}$ NW $\frac{1}{4}$

Latitude: 454840 Longitude: 1123447 Elevation: 6880

USGS Quad: BUTTE SOUTH (15)

Location: HIGHLAND MOUNTAINS, BURTON PARK AND UPPER NORTH FORK TUCKER CREEK, CA. 12 AIR
MILES SSW. OF BUTTE; ALONG HIGHLAND RD. (N.F. RD. #84).

suitable habitat is found until approximately 1.5 air miles east of Champion Pass along Powderhorn Creek. The first collection from the Anaconda area was originally made by Dr. C.C. Albright (807, MONT); the location was given as "Anaconda, mountain swales." The immediate Anaconda vicinity also does not contain any suitable habitat (P. Lesica, pers. comm.; J.S. Shelly, pers. obs.). It is likely that the latter specimen was taken from the extensive, higher-elevation meadows in the French Creek area, approximately 14 air miles SSW. of Anaconda.

4. UNVERIFIED/UNDOCUMENTED REPORTS: None known.

5. AREAS SURVEYED BUT TAXON NOT LOCATED: The following areas were surveyed for Claytonia lanceolata var. flava because the habitat appeared to be suitable on the topographic maps, but the species was not located within them. The actual areas surveyed are smaller than the portions of the sections indicated.

- a. T1N, R7W, Section 9, NW $\frac{1}{4}$ NW $\frac{1}{4}$
- b. T1N, R7W, Section 31, SW $\frac{1}{4}$
T1S, R8W, Section 1, NW $\frac{1}{4}$ NW $\frac{1}{4}$
Section 2, SE $\frac{1}{4}$ NE $\frac{1}{4}$
- c. T1N, R15W, Section 11, SW $\frac{1}{4}$ SW $\frac{1}{4}$
Section 14, NW $\frac{1}{4}$ NW $\frac{1}{4}$
- d. T1N, R15W, Section 15, W $\frac{1}{2}$ SW $\frac{1}{4}$
- e. T1N, R15W, Section 3, NE $\frac{1}{4}$ NW $\frac{1}{4}$, NW $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ SE $\frac{1}{4}$
T2N, R15W, Section 34, W $\frac{1}{2}$ SW $\frac{1}{4}$
- f. T1N, R16W, Section 33, SW $\frac{1}{4}$ SW $\frac{1}{4}$
- g. T2N, R9W, Section 19, NE $\frac{1}{4}$ NW $\frac{1}{4}$
T2N, R10W, Section 24, NE $\frac{1}{4}$ SE $\frac{1}{4}$
T2N, R10W, Section 25, NE $\frac{1}{4}$ NE $\frac{1}{4}$
- h. T2N, R10W, Section 28, E $\frac{1}{2}$ NW $\frac{1}{4}$
- i. T2N, R14W, Section 24, SE $\frac{1}{4}$ SW $\frac{1}{4}$
Section 25, NE $\frac{1}{4}$ NW $\frac{1}{4}$
- j. T2N, R14W, Section 27, NE $\frac{1}{4}$ NW $\frac{1}{4}$, NW $\frac{1}{4}$ NE $\frac{1}{4}$
- k. T4N, R7W, Section 13, W $\frac{1}{2}$ SW $\frac{1}{4}$
Section 25, NE $\frac{1}{4}$ NW $\frac{1}{4}$
Section 35, NE $\frac{1}{4}$ SW $\frac{1}{4}$

- l. T6N, R7W, Section 23, SW $\frac{1}{4}$ SW $\frac{1}{4}$
Section 25, NW $\frac{1}{4}$
Section 26, NE $\frac{1}{4}$ NE $\frac{1}{4}$
- m. T1S, R11W, Section 15, NE $\frac{1}{4}$ NW $\frac{1}{4}$
- n. T1S, R17W, Section 26, W $\frac{1}{2}$ NE $\frac{1}{4}$
- o. T2S, R17W, Section 15, NW $\frac{1}{4}$ SW $\frac{1}{4}$
Section 16, NE $\frac{1}{4}$ SE $\frac{1}{4}$

E. HABITAT

- 1. ASSOCIATED VEGETATION: Claytonia lanceolata var. flava occurs in moist meadows and poorly drained swales at relatively high elevations. The associated vegetation is dominated by grasses and perennial forbs. Associated species observed in 1988 include:

Agropyron caninum (slender wheatgrass)
Arabis nuttallii (Nuttall's rockcress)
Artemisia cana (silver sagebrush)
Camassia quamash (common camas)
Danthonia intermedia (timber danthonia)
Deschampsia cespitosa (tufted hair-grass)
Dodecatheon conjugens (slippod shooting star)
Festuca scabrella (rough fescue)
Geum triflorum (old man's whiskers)
Lomatium coulteri (Cous biscuit root)
Mertensia longiflora (small bluebells)
Microseris nigrescens (black-hairy microseris)
Polygonum bistortoides (American bistort)
Potentilla diversifolia (diverse-leaved cinquefoil)
Potentilla fruticosa (shrubby cinquefoil)
Ranunculus alismaefolius (dwarf plainleaf buttercup)
Saxifraga rhomboidea (diamondleaf saxifrage)
Senecio foetidus (sweet-marsh butterweed)
Wyethia helianthoides (whiteheaded Wyethia)

At three locations, C. lanceolata var. lanceolata was found growing in close proximity to var. flava: Lockhart Meadows (001), French Creek (002), and Vipond Park (003). However, there appears to be a difference in the habitats usually occupied by the two varieties. Variety lanceolata often occurs on fairly well-drained, open areas of loamy to gravelly soil, sometimes on rather steep slopes or along intermittent drainages. Variety flava generally prefers level to gently sloping meadows with dense vegetation, often in large basins or areas of outwash sediments. These

latter sites have heavier, more poorly drained soils that are clayey in texture. The noteworthy exceptions to these observations are at the French Creek and Lockhart Meadows sites. At French Creek, var. flava occurs in some areas on steeper slopes (up to 10%), and var. lanceolata grows directly adjacent to it in a few small open areas. At Lockhart Meadows, the two varieties coexist in a slightly higher area near the west end of the site. Otherwise, the varieties do not overlap significantly at any of the known locations.

2. **TOPOGRAPHY:** In Montana, populations of C. lanceolata var. flava are found in level to gently sloping areas that vary from zero to approximately ten percent slope. It was found on all aspects. Although found throughout the meadows and swales where it occurs, C. lanceolata var. flava is particularly abundant in depressions in these habitats, especially at the Hebgen Lake (004) site.

The known sites in Montana range from 1980 m. (6500 ft.) to 2500 m. (8200 ft.) in elevation.

3. **SOIL RELATIONSHIPS:** In Montana, the areas occupied by C. lanceolata var. flava are generally comprised of heavy clay loam soils. These soils are poorly drained, owing to the clayey soil textures and gentle topography of the sites. Also, snow accumulation is deep, and snowmelt is often relatively late, in these high meadows. This results in soil saturation through the early growing season.

Claytonia lanceolata var. flava does not appear to be restricted to soils derived from specific parent materials. The rock types associated with the sites range from volcanic to sedimentary in origin (Veseth and Montagne 1980). The Lockhart Meadows (001) site is in an area of Udic/Ustic-Frigid/Cryic Inceptisols (moderately sloping soils on mountains); the French Creek (002) site is in an area of Ustic-Cryic Mollisols (nearly level to steep soils on fans, benches, and terraces); the Vipond Park (003) site is in an area of Udic/Ustic-Frigid/Cryic Mollisols-Inceptisols-Alfisols (gently sloping soils on mountains); the Hebgen Lake (004) site is in an area of Udic-Frigid/Cryic Inceptisols-Entisols (nearly level soils on outwash terraces); and the Burton Park (005) site is in an area of Udic-Cryic Inceptisols-Alfisols (moderately sloping soils on mountains) (Montagne et al. 1982).

4. **REGIONAL CLIMATE:** The climate of southwestern Montana can generally be classified as dry and cool, although higher amounts of precipitation occur in the mountains. For the distributional area of C. lanceolata var. flava in Montana, the nearest climatological stations are located at East Anaconda (1680 m. (5511 ft.)), Divide (1648 m. (5406 ft.)), and West Yellowstone (2031 m. (6662 ft.)). Data for the period 1951-1980 are provided by the U.S. Department of Commerce (1982). At East Anaconda, the mean annual precipitation was 35.15 cm. (13.84 in.); the mean annual temperature was 5.78°C (42.4°F), the mean January minimum was -9.72°C (14.5°F), and the mean July maximum was 25.94°C (78.7°F). At Divide, the mean annual precipitation was 31.47 cm. (12.39 in.); the mean annual temperature was 4.83°C (40.7°F), the mean January minimum was -13.06°C (8.5°F), and the mean July maximum was 26.33°C (79.4°F). These two stations are at considerably lower elevations than the nearby sites; the habitats are thus expected to be cooler and moister than these recorded figures. The West Yellowstone station is at nearly the same elevation as the site near Hebgen Lake, which is approximately 6 air miles to the west-northwest. The mean annual precipitation was 56.74 cm. (22.34 in.); the mean annual temperature was 1.61°C (34.9°F), the mean January minimum was -17.83°C (-0.1°F), and the mean July maximum was 26.33°C (79.4°F).

F. POPULATION DEMOGRAPHY AND BIOLOGY

1. **PHENOLOGY:** In Montana, C. lanceolata var. flava typically begins blooming by early May at the lowest-elevation sites; peak flowering occurs in mid- to late May. At higher elevations (i.e., Vipond Park (003)), flowering can persist into mid-June, and a few individuals have been observed in bloom as late as the first week of July. Yearly climatic differences would influence these events, especially in the higher elevations where dramatic weather shifts often take place. Fruiting begins by late May; it is unknown how long the fruits persist, but it is likely that seed dispersal takes place rapidly after fruit maturation.

2. **POPULATION SIZE AND CONDITION:** All five populations of C. lanceolata var. flava in Montana are very large. The number of plants at each site was estimated in 1988. They range in size from 10,000+ to 35,000+ individuals. The populations

are typically subdivided into patchily distributed large colonies, spread over extensive areas.

A summary of the population size and condition for each site is given in Table 2.

3. REPRODUCTIVE BIOLOGY

a. **TYPE OF REPRODUCTION:** Claytonia lanceolata var. flava appears to reproduce by sexual production of seeds; these give rise to plants with deep-seated corms. Vegetative spread by growth or splitting of the corms was not observed in specimens collected during field surveys in 1988.

b. **POLLINATION BIOLOGY:** The details are unknown, but it is possible that C. lanceolata var. flava is predominantly self-pollinating; the flowers close in the late afternoon, and open again with warming during the morning. This corolla closure is tight enough that self-pollination may occur as a result of the anthers being pressed toward the stigma. However, insects (small bees) were observed visiting the flowers at the French Creek site on 18 May 1988; it is possible that some pollination results from such activity.

c. **SEED DISPERSAL AND BIOLOGY:** Details unknown; the seeds of these perennial Claytonia taxa are relatively large, and it is likely that dispersal does not extend far from the parental plants. The large seed size is possibly an adaption allowing for efficient germination and corm establishment in the dense associated vegetation of the meadow habitats.

G. POPULATION ECOLOGY

1. BIOLOGICAL INTERACTIONS

a. **COMPETITION:** As noted in I.F.3.c. above, C. lanceolata var. flava occurs in the dense grassland/forb vegetation of meadow habitats. However, annual growth and flowering occur early in the growing season, prior to vigorous growth by many of the associated species. This phenological pattern may allow for efficient germination and photosynthesis, especially considering the short stature of mature individuals.

TABLE 2. Population size and condition, Claytonia lanceolata var. flava, Montana.

Occurrence number: 001

Site name: LOCKHART MEADOWS (CHAMPION PASS)

Acreage: 600

Population size and condition: EST. 30,000-35,000+ PLANTS, IN NUMEROUS LARGE COLONIES OVER EXTENSIVE MEADOW AREAS; PLANTS RANGING FROM MOSTLY YELLOW-FLOWERED TO CA. 2/3 WHITE-FLOWERED.

Occurrence number: 002

Site name: FRENCH CREEK (ANACONDA)

Acreage: 800

Population size and condition: CA. 10,000-20,000+ INDIVIDUALS, IN SEVEN AREAS; YELLOW PLANTS OCCUR MIXED WITH WHITE ONES, IN VARYING RATIOS FROM ALL YELLOW TO 1:100+ YELLOW:WHITE, THROUGHOUT THE AREA; SITE PROBABLY SAME AS ORIGINAL "ANACONDA" RECORDS.

Occurrence number: 003

Site name: VIPOND PARK

Acreage: 800

Population size and condition: CA. 10,000+ PLANTS; MIXED YELLOW AND WHITE, GRADING TO WHITE ONLY TO THE SOUTH; RELOCATION OF 1982 SITING BY K. SCOW.

Occurrence number: 004

Site name: HEBGEN LAKE

Acreage: 1200

Population size and condition: EST. 15,000-20,000+ INDIVIDUALS, IN TWO MAIN AREAS; PLANTS VIRTUALLY ALL YELLOW-FLOWERED, WITH ONLY A FEW WHITE-FLOWERED INDIVIDUALS OBSERVED (POPULATION UNUSUAL IN THIS RESPECT).

Occurrence number: 005

Site name: BURTON PARK

Acreage: 200

Population size and condition: CA. 16,100 PLANTS IN SIX SUBPOPULATIONS; ONLY WHITE-FLOWERED PLANTS OBSERVED.

b. HERBIVORY: During surveys in 1988, it did not appear that the habitats occupied by C. lanceolata var. flava had been influenced by recent heavy grazing by domestic livestock. Much of the occupied habitat at three sites (Lockhart Meadows (001), Hebgen Lake (004), and Burton Park (005)) is privately owned, and grazing appeared to be mainly restricted to these inholdings. Also, the season of grazing use probably occurs primarily after the flowering and fruiting times for the taxon. Thus, it does not appear that serious impacts from livestock grazing are occurring under present management practices. However, potential impacts to the habitats later in the growing season should be assessed, to determine if grazing use is influencing soil erosion patterns or resulting in weed invasion.

H. LAND OWNERSHIP

1. The land ownership for the five occurrences currently known in Montana is given below; four of the five sites occur in areas of mixed ownership that include U.S. Forest Service lands. The exact locations are provided in Table 1, p. 6.

a. U.S.D.A. FOREST SERVICE:

i. Beaverhead National Forest, Wise River Ranger District:

French Creek (002) - portion
Vipond Park (003) - all

ii. Deerlodge National Forest:

Jefferson Ranger District:

Lockhart Meadows (001) - portion

Butte Ranger District:

Burton Park (005) - portion

iii. Gallatin National Forest, Hebgen Lake Ranger District:

Hebgen Lake (004) - portion

b. U.S.D.I. BUREAU OF LAND MANAGEMENT:

i. Butte District Office, Headwaters Resource Area:

French Creek (002) - portion

c. STATE OF MONTANA:

i. Department of Fish, Wildlife and Parks, Mt. Haggin Game Management Area:

French Creek (002) - portion

ii. Department of State Lands:

French Creek (002) - portion

e. PRIVATE OWNERSHIP (PARTIAL):

Lockhart Meadows (001)
Hebgen Lake (004)
Burton Park (005)

II. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

A. THREATS TO CURRENTLY KNOWN POPULATIONS (MONTANA):

Based on field observations in 1988, the five known populations of Claytonia lanceolata var. flava currently appear to be stable. They are large, and cover extensive areas. However, the sites are potentially threatened by several land uses, including: 1.) road construction, 2.) mining, and 3.) recreational use. Potential impacts from grazing and timber harvesting are possible, but it does not appear that these threats are imminent. The sites that may potentially be influenced by these activities are reviewed below:

1. ROAD CONSTRUCTION: All known sites could potentially be impacted by further road construction, and/or maintenance of existing routes. The habitats of all five populations are partially bisected by major U.S. Forest Service access routes. If more roads are constructed, it is expected that additional portions of the sites would be eliminated. The site where potential road construction seemed to be most imminent is Vipond Park (003); the potential for increased mining activity in this area (discussed below) might result in the construction of new roads in the meadow habitats.

2. **MINING:** The site that could be most impacted by this activity is Vipond Park (003). Nearby areas in Quartz Hill Gulch (Daisy Vein, Great Western, Knoby, and Lone Pine mines) have been extensively mined in the past. In addition, test pits and claim stakes are located in the sparsely forested areas just north of the site along the Quartz Hill Gulch road (east side of Gray Jockey Peak). The increase in mining activity throughout western Montana, especially for gold, may result in expanded exploration in the Vipond Park area, and future mining operations should take this population of C. lanceolata var. flava into consideration. The four other populations do not appear to be threatened by existing or potential mining at this time.
3. **RECREATIONAL USE:** Recreational use of areas in Vipond Park (003) poses potential threats to the C. lanceolata var. flava population in the meadows. Off-road vehicle disturbance was noticeable; a number of jeep trails have been formed in the turf of the meadows, and these trails are deeply rutted in many places. The main time period for this use appears to be during the spring, when off-road travel to avoid snow drifts and puddles is frequent, and also possibly during the fall hunting season. Long-term use of the trails may eventually result in local soil compaction or erosion, which could have an impact on the corms of the plants. Portions of the Lockhart Meadows (001) population are traversed by Deerlodge N.F. Rd. #82, and some plants were probably destroyed during construction. Much of the meadow habitat at this site is privately owned, however, and it did not appear to be seriously impacted by off-road vehicle use at the present time. The French Creek (002) site is traversed by State Highway 274, and in part by Beaverhead N.F. Rd. #1000 and other little-used jeep trails. The Hebgen Lake (004) site is traversed in part by Gallatin N.F. Rd. #167, which serves as a major access route to the lake. However, most of the habitat area near Hebgen Lake is privately owned ranch land. Serious off-road impacts were not observed at either of the latter two sites.

B. **MANAGEMENT PRACTICES AND RESPONSE:** No detailed information is available regarding the response of C. lanceolata var. flava to management practices (grazing, habitat alteration through road construction or mining). Because the taxon blooms and fruits early in the growing season, and persists as deep-seated corms

approximately three to five inches beneath the soil surface, impacts from grazing later in the season are not expected to be intense. Once uprooted or exposed by major soil disturbance or erosion, however, it is not expected that the corms would survive. Also, no evidence was found during field surveys to indicate that C. lanceolata var. flava is capable of aggressively invading disturbed areas such as roadbanks or rock pits; it appears to be adapted to undisturbed, moist montane grasslands.

C. RECOMMENDATIONS FOR MAINTAINING VIABLE POPULATIONS:
The following recommendations are made to insure the long-term persistence of viable populations of C. lanceolata var. flava on U.S. Forest Service lands in Montana:

1. Protection of natural habitats which currently support populations. All known populations occur, wholly or partially, on U.S. Forest Service lands. They should be considered in any habitat alteration projects which may occur in their vicinity. If disturbance is proposed within or near the population areas, detailed surveys should be conducted, and mitigation measures developed to reduce or eliminate project impacts. The most likely impacts may be from increased mining activity in the Vipond Park area in the Pioneer Mountains.

It should be noted that the electrophoretic analysis revealed genetic differentiation among populations of C. lanceolata var. flava (see Appendix A, pp. 41-42). Thus, it will be important to maintain all known populations, in order to protect the full range of genetic variation within the taxon.

2. Notification of weed control and road maintenance crews, range conservationists, and all other appropriate U.S. Forest Service personnel, of population locations. Maps detailing the site locations should be provided to all such personnel, to aid in reducing or eliminating unnecessary impacts to these areas.
3. Monitoring of early-season livestock grazing in native habitats. As noted above, grazing does not currently appear to pose a threat to the known populations. However, changes in grazing use patterns, especially in the Vipond Park area, should be closely monitored if early season use is planned.

D. RECOMMENDATIONS FOR FURTHER ASSESSMENT:

1. Further field surveys in potential habitats in southwestern Montana. Although likely montane grassland habitat was surveyed in the vicinity of Fleecer Mountain, Elk Park, the southeast flank of the Anaconda-Pintlar Range, and along the Continental Divide north of Butte, there are other areas of potential occurrence in southwestern Montana. The areas most likely to contain additional habitat occur in the Gravelly Range; large meadow areas are visible in the southern part of the range from the vicinity of Raynolds Pass. Though less likely to contain large, level meadow areas, potential habitat might also occur in the Tobacco Root, Madison, and Gallatin ranges. Also, it is likely that the taxon could be found in Yellowstone National Park (mainly in Wyoming); the area lies between known sites in southwestern Montana and northwestern Wyoming, and contains areas of extensive moist grasslands at high elevations.
2. Establishment of monitoring studies on U.S. Forest Service lands. Permanent belt transects, using the methods of Lesica (1987), may be useful in assessing any future impacts that might arise from grazing or mining activities.

E. **SUMMARY:** Claytonia lanceolata var. flava is a regional endemic currently known from seven sites in the northern Rocky Mountains: five locations in southwestern Montana (Beaverhead, Deer Lodge, Gallatin, Jefferson, and Silver Bow counties), one location in Idaho (Fremont County), and one location in Wyoming (Fremont County). Field surveys in 1988 resulted in the rediscovery of two historical locations (Lockhart Meadows (Champion Pass) and French Creek (Anaconda)), and the discovery of one previously unrecorded site (Burton Park). Surveys of the two recently discovered sites (Vipond Park (003) and Hebgen Lake (004)) showed them to be more extensive than previously documented. All five populations in Montana occur wholly or partially on U.S. Forest Service lands; it has been found on the Beaverhead, Deerlodge, and Gallatin National Forests. Claytonia lanceolata var. flava is a Category 2 (federal candidate) taxon, being considered for listing under the federal Endangered Species Act of 1973 by the U.S. Fish and Wildlife Service. In addition, it is listed as a sensitive plant in Region 1 of the U.S. Forest Service. Systematic studies, which are currently in progress, indicate that C. lanceolata var. flava is very distinct from C. lanceolata var. lanceolata, possibly at the species level. Final

results will be provided when available. The five known populations of C. lanceolata var. flava in Montana are all very large, and currently appear to be stable. However, potential impacts resulting from road construction, mining, and recreational use should be closely monitored, to insure that listing of Claytonia lanceolata var. flava under the federal Endangered Species Act does not become necessary in the future.

III. LITERATURE CITED

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IV. ELEMENT OCCURRENCE PRINT-OUTS AND MAPS (PP. 22-31)

ELEMENT OCCURRENCE RECORD

EOCODE: PDPOR03092.001
 NAME: CLAYTONIA LANCEOLATA VAR FLAVA
 COMNAME: YELLOW SPRINGBEAUTY
 MARGNUM: 3 TENTEN: 8,1 IDENT: Y EORANK: A
 SURVEYSITE: LOCKHART MEADOWS (CHAMPION PASS)
 EORANKCOMM: VERY EXTENSIVE POPULATION, IN FAIRLY UNDISTURBED AREA.
 SURVEYDATE: 1988-06-04 LASTOBS: 1988-06-04 FIRSTOBS: 1966 GRANK: G5T1
 SRANK: S1 STATE: MT COUNTYNAME: MTJEFF
 QUADCODE: 4611225
 QUADNAME: BUTTE NORTH (15') PRECISION: SC
 LAT: 461409 LONG: 1123325 S: 461228 N: 461455 E: 1123155 W: 1123341
 TOWNRANGE: 006N008W SECTION: 35 MERIDIAN: PR TRSCOMM: NE4,25E2,26S
 E4,36;+
 PHYSPROV: NR WATERSHED: 10020006 RIVERREACH: 10020006 00.00
 DIRECTIONS: ALSO T6NR7W:30NW4,31SW4;T5NR8W:1,2NE4NE4. POWDERHORN CREEK
 AND LOCKHART MEADOWS, UPPER BOULDER RIVER DRAINAGE, 2.6-3.0
 AIR MILES ENE TO SOUTHEAST OF CHAMPION PASS.
 GENDESC: MOIST, POORLY DRAINED MONTANE MEADOWS; WITH DODECATHEON
 CONJUGENS, POLYGONUM BISTORTOIDES, POTENTILLA FRUTICOSA,
 RANUNCULUS ALISMAEOLIUS.
 ELEV: 6550 SIZE: 600
 EODATA: EST. 30,000-35,000+ PLANTS, IN NUMEROUS LARGE COLONIES OVER
 EXTENSIVE MEADOW AREAS; PLANTS RANGING FROM MOSTLY YELLOW-
 FLOWERED TO CA. 2/3 WHITE-FLOWERED.
 COMMENTS: VOUCHERS-SHELLY, J.S. (1417), 1988, MONTU; PROBABLE
 RELOCATION OF TRASK, F. (377), 1966, MONT.
 MACODE1: PRIVATEOWNMTUS CONTAINED1: N MACODE2: FFSNFDEER2MTUS CONTAINED2:
 N
 MACODE3: CONTAINED3: ADLMAS: MORELAN: MOREPROT:
 MOREMGMT: B SITECODE:
 SITENAME:
 OWNER: PRIVATE; DEERLODGE N.F.
 OWNERCOMM:
 PROTCOMM:
 MGMTCOMM:
 MONITOR: MONITORNUM: -
 BESTSOURCE: SCHASSBERGER, L.A. 1988. FIELD SURVEYS IN JEFFERSON,
 MADISON, SILVERBOW, AND BEAVERHEAD COUNTIES.
 SOURCECODE: F88SCH03MTUS PNDSCHE02MTUS S88SHEUMMTUS PNDSCHE01MTUS PNDLES01MTUS
 U85LES02MTUS S66TRAMTMTUS
 DATASENS: N BOUNDARIES: Y PHOTOS: Y OWNERINFO:
 TRANSCRIER: 88-08-09 JSS CDREV: Y MAPPER: 88-08-09 JSS QC: Y
 UPDATE: 88-08-09 JSS

ELEMENT OCCURRENCE RECORD

EOCODE: PDPOR03092.002
 NAME: CLAYTONIA LANCEOLATA VAR FLAVA
 COMNAME: YELLOW SPRINGBEAUTY
 MARGNUM: 4 TENTEN: 7,5 IDENT: Y EORANK: A
 SURVEYSITE: FRENCH CREEK (ANACONDA)
 EORANKCOMM: VERY LARGE POPULATION, AREA FAIRLY UNDISTURBED.
 SURVEYDATE: 1988-05-17 LASTOBS: 1988-05-18 FIRSTOBS: 1911 GRANK: G5T1
 SRANK: S1 STATE: MT COUNTYNAME: MTDEER
 QUADCODE: 4511381
 QUADNAME: LINCOLN GULCH PRECISION: SC
 LAT: 455641 LONG: 1130225 S: 455607 N: 455832 E: 1130032 W: 1130330
 TOWNRANGE: 002N012W SECTION: 12 MERIDIAN: PR TRSCOMM: NW4,1,2,11++
 PHYSPROV: NR WATERSHED: 10020004 RIVERREACH: 1701020104500.00
 DIRECTIONS: ALSO T3NR11W:31;T3NR12W:25,35,36. FRENCH AND CALIFORNIA
 CREEKS, MT. HAGGIN WILDLIFE MANAGEMENT AREA, ALONG HWY. 274
 CA. 17.5-20 MILES SSW OF ANACONDA.
 GENDESC: MOIST MONTANE GRASSLANDS; WITH DESCHAMPSIA CESPITOSA,
 DANTHONIA INTERMEDIA, DODECATHEON CONJUGENS, POLYGONUM
 BISTORTOIDES, POTENTILLA DIVERSIFOLIA, LOMATIUM COUS.
 ELEV: 6500 SIZE: 800
 EODATA: CA. 10,000-20,000+ INDIVIDUALS, IN SEVEN AREAS; YELLOW
 PLANTS OCCUR MIXED WITH WHITE ONES, IN VARYING RATIOS FROM
 ALL YELLOW TO 1:100+ YELLOW:WHITE, THROUGHOUT THE AREA; SITE
 PROBABLY SAME AS ORIGINAL "ANACONDA" RECORDS - SEE GMF, EF.
 COMMENTS: VOUCHERS-SHELLY, J.S. (1413) & P. LESICA, 1988, MONTU;
 ALBRIGHT (807), 1911, MONT; BLANKINSHIP (768), POM.
 MACODE1: SFWWMMTHA1MTUS CONTAINED1: N MACODE2: FBLODOBUTT4MTUS CONTAINED2:
 N
 MACODE3: FFSNFBEAV2MTUS CONTAINED3: N ADLMAS: Y MORELAN: MOREPROT:
 MOREMGMT: B SITECODE:
 SITENAME:
 OWNER: STATE OF MONTANA, BLM, USFS
 OWNERCOMM:
 PROTCOMM:
 MGMTCOMM:
 MONITOR: MONITORNUM: -
 BESTSOURCE: SHELLY, J.S. 1988. FIELD SURVEYS IN SOUTHWESTERN MONTANA OF
 8 MAY, 17-18 MAY, 25-27 MAY, 4 & 10 JUNE.
 SOURCECODE: F88SHE01MTUS PNDSHE01MTUS PNDLES01MTUS S88SHEUMMTUS PNDCAM01MTUS
 S11ALBMTMTUS
 DATASENS: N BOUNDARIES: Y PHOTOS: Y OWNERINFO:
 TRANSCRIBR: 88-08-03 JSS CDREV: Y MAPPER: 88-08-03 JSS QC: Y
 UPDATE: 88-12-01 JSS

ELEMENT OCCURRENCE RECORD

EOCODE: PDPOR03092.003
 NAME: CLAYTONIA LANCEOLATA VAR FLAVA
 COMNAME: YELLOW SPRINGBEAUTY
 MARGNUM: 3 TENTEN: 4,3 IDENT: Y EORANK: AB
 SURVEYSITE: VIPOND PARK
 EORANKCOMM: ROADS, MINING ACTIVITIES AND GRAZING ARE POTENTIAL THREATS.
 SURVEYDATE: 1988-06-07 LASTOBS: 1988-06-10 FIRSTOBS: 1982 GRANK: G5T1
 SRANK: S1 STATE: MT COUNTYNAME: MTBEAV
 QUADCODE: 451126B
 QUADNAME: VIPOND PARK (15) PRECISION: SC
 LAT: 454154 LONG: 1125508 S: 453943 N: 454207 E: 1125320 W: 1125607
 TOWNRANGE: 002S011W SECTION: 02 MERIDIAN: PR TRSCOMM: 1N2,11W2,S2S
 E4,+
 PHYSPROV: NR WATERSHED: 10020004 RIVERREACH: 1002000415600.00
 DIRECTIONS: ALSO 12SW4SW4,13NW4,14N2;T1SR11W:35SE4. PIONEER MOUNTAINS,
 CA. 8 MILES SOUTH OF DEWEY, UP QUARTZ HILL GULCH RD. TO
 VIPOND PARK; EAST OF ROAD.
 GENDESC: OPEN PARK LAND, WITH LATE SNOWMELT AND POOR DRAINAGE; WITH
 POTENTILLA FRUTICOSA, POLYGONUM BISTORTOIDES, RANUNCULUS
 ALISMAEOLIUS, GEUM TRIFLORUM, MERTENSIA LONGIFLORA.
 ELEV: 8200 SIZE: 800
 EODATA: CA. 10,000+ PLANTS; MIXED YELLOW AND WHITE, GRADING TO WHITE
 ONLY TO THE SOUTH; RELOCATION OF 1982 SITING BY K. SCOW.

 COMMENTS: VOUCHER-SCHASSBERGER, L.A. (206), 1988, MONTU; SCOW, K.
 (S.N.), 1982, WESTECH (HELENA, MT).
 MACODE1: FFSNFBEAV2MTUS CONTAINED1: Y MACODE2: CONTAINED2:

 MACODE3: CONTAINED3: ADLMAS: MORELAN: MOREPROT:
 MOREMGMT: B SITECODE:
 SITENAME:
 OWNER: BEAVERHEAD NATIONAL FOREST
 OWNERCOMM:
 PROTCOMM:
 MGMTCOMM:
 MONITOR: MONITORNUM:
 BESTSOURCE: SCHASSBERGER, L.A. 1988. FIELD SURVEYS IN JEFFERSON,
 MADISON, SILVERBOW, AND BEAVERHEAD COUNTIES.
 SOURCECODE: F88SCH03MTUS PNDSC02MTUS S88SCHUMMTUS PNDSC01MTUS PNDSC001MTUS
 S88SHEUMMTUS S82SC0WTMTUS
 DATASENS: N BOUNDARIES: Y PHOTOS: Y OWNERINFO:
 TRANSCRIER: 88-08-03 LAS CDREV: Y MAPPER: 88-08-09 JSS QC: Y
 UPDATE: 88-12-01 JSS

ELEMENT OCCURRENCE RECORD

EOCODE: PDPOR03092.004
 NAME: CLAYTONIA LANCEOLATA VAR FLAVA
 COMNAME: YELLOW SPRINGBEAUTY
 MARGNUM: 1 TENTEN: 2,2 IDENT: Y EORANK: B
 SURVEYSITE: HEBGEN LAKE
 EORANKCOMM: EXTENSIVE OCCURRENCE, BUT HABITAT ALTERED IN MANY LOCATIONS.
 SURVEYDATE: 1988-05-26 LASTOBS: 1988-05-27 FIRSTOBS: 1986 GRANK: G5T1
 SRANK: S1 STATE: MT COUNTYNAME: MTGALL
 QUADCODE: 4411162
 QUADNAME: MADISON ARM PRECISION: SC
 LAT: 444338 LONG: 1111359 S: 444136 N: 444342 E: 1111240 W: 1111415
 TOWNRANGE: 013S004E SECTION: 03 MERIDIAN: PR TRSCOMM: SW4,4SE4,9NE
 4,10N2,+
 PHYSPROV: MR WATERSHED: 10020007 RIVERREACH: 1002000707000.00
 DIRECTIONS: ALSO 14NW4,15,23NW4. SOUTH OF HEBGEN LAKE, WEST SIDE OF
 MADISON VALLEY, CA. 0.5-3 AIR MILES SOUTH OF LONESOMEHURST
 CAMPGROUNDS, EAST AND SOUTH OF HEBGEN LAKE RD. (#167).
 GENDESC: MOIST GRASSLANDS, IN LOAM AND CLAY LOAM SOILS; WITH WYETHIA
 HELIANTHOIDES, CAMASSIA QUAMASH, POLYGONUM BISTORTOIDES,
 POTENTILLA FRUTICOSA, ARTEMISIA CANA, DODECATHEON.
 ELEV: 6550 SIZE: 1200
 EODATA: EST. 15,000-20,000+ INDIVIDUALS, IN TWO MAIN AREAS; PLANTS
 VIRTUALLY ALL YELLOW-FLOWERED, WITH ONLY A FEW WHITE-
 FLOWERED INDIVIDUALS OBSERVED (POPULATION UNUSUAL IN THIS
 RESPECT).
 COMMENTS: VOUCHERS-SHELLY, J.S. (1419) & P. LESICA, 1988, MONTU;
 NIXON, J. (1), 1987, MONT.
 MACODE1: PRIVATEOWNMTUS CONTAINED1: N MACODE2: FFSNFGALL7MTUS CONTAINED2:
 N
 MACODE3: CONTAINED3: ADLMAS: MORELAN: MOREPROT:
 MOREMGMT: B SITECODE:
 SITENAME:
 OWNER: PRIVATE; GALLATIN N.F.
 OWNERCOMM:
 PROTCOMM:
 MGMTCOMM:
 MONITOR: MONITORNUM:
 BESTSOURCE: SHELLY, J.S. 1988. FIELD SURVEYS IN SOUTHWESTERN MONTANA OF
 8 MAY, 17-18 MAY, 25-27 MAY, 4 & 10 JUNE.
 SOURCECODE: F88SHE01MTUS PNDL01MTUS PNDLES01MTUS S88SHEUMMTUS PNDNIX01MTUS
 S87NIXMTMTUS
 DATASENS: N BOUNDARIES: Y PHOTOS: Y OWNERINFO:
 TRANSCRIBR: 88-08-05 JSS CDREV: Y MAPPER: 88-08-05 JSS QC: Y
 UPDATE: 88-08-08 JSS

ELEMENT OCCURRENCE RECORD

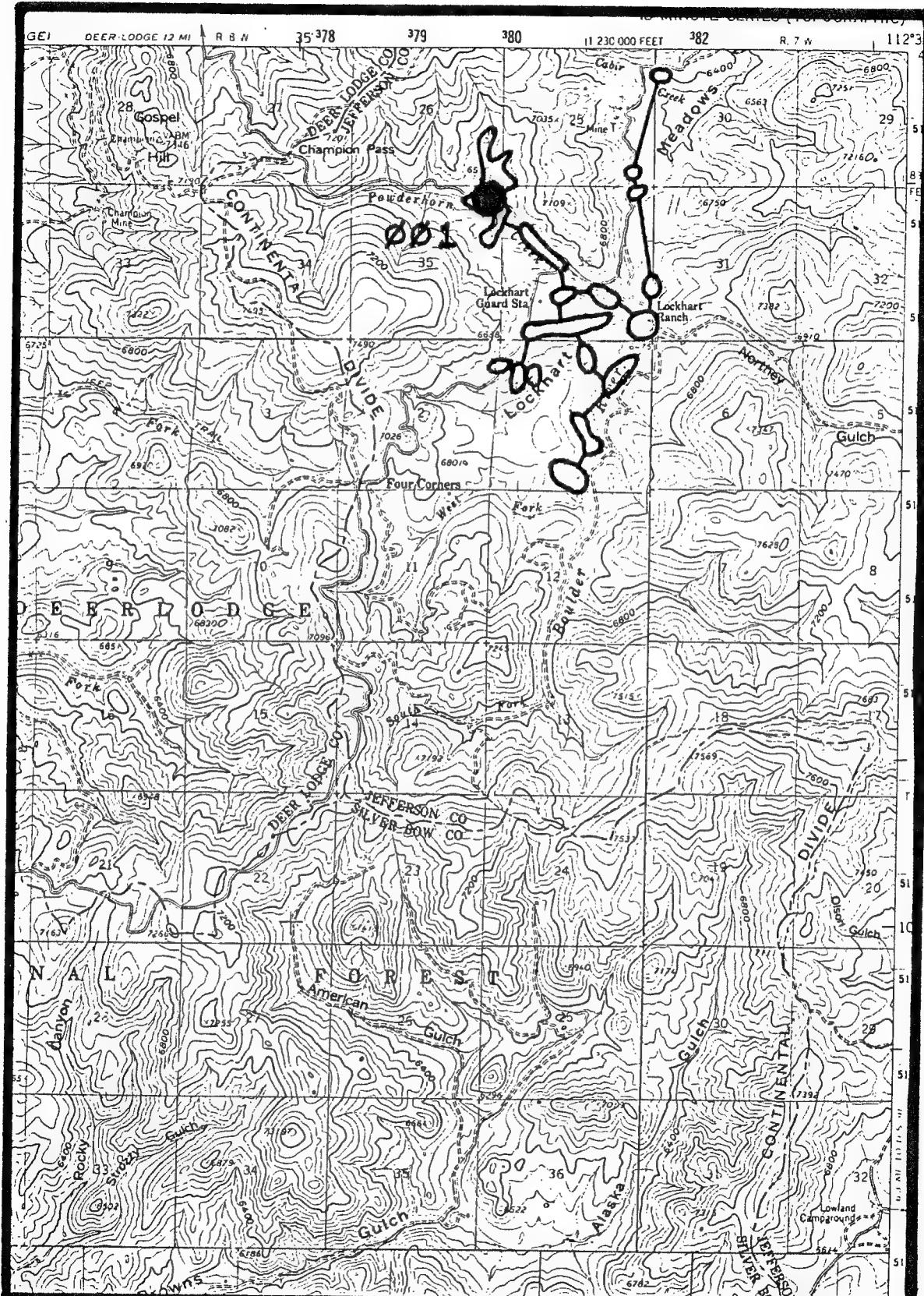
EOCODE: PDPOR03092.005
 NAME: CLAYTONIA LANCEOLATA VAR FLAVA
 COMNAME: YELLOW SPRINGBEAUTY
 MARGNUM: 4 TENTEN: 7,8 IDENT: Y EDRANK: A
 SURVEYSITE: BURTON PARK
 EORANKCOMM: LARGE, REPRESENTATIVE POPULATION; ALL WHITE-FLOWERED.
 SURVEYDATE: 1988-06-05 LASTOBS: 1988-06-05 FIRSTOBS: 1988 GRANK: G5T1
 SRANK: S1 STATE: MT COUNTYNAME: MTSILV
 QUADCODE: 4511275
 QUADNAME: BUTTE SOUTH (15) PRECISION: SC
 LAT: 454840 LONG: 1123447 S: 454746 N: 454913 E: 1123345 W: 1123652
 TOWNRANGE: 001N008W SECTION: 27 MERIDIAN: PR TRSCOMM: SW4NE4,NE4NW
 4,E2SE4+
 PHYSPROV: NR WATERSHED: 10020004 RIVERREACH:
 DIRECTIONS: ALSO 22S2SW4,26SW4SW4,35NW4NW4,20E2SE4. HIGHLAND MOUNTAINS,
 BURTON PARK AND UPPER NORTH FORK TUCKER CREEK, CA. 12 AIR
 MILES SSW. OF BUTTE; ALONG HIGHLAND RD. (N.F. RD. #84).
 GENDESC: LARGE LEVEL MEADOW, WITH POTENTILLA FRUTICOSA, DODECATHEON
 CONJUGENS, POLYGONUM BISTORTOIDES, GEUM TRIFLORUM.
 ELEV: 6880 SIZE: 200
 EODATA: CA. 16,100 PLANTS IN 6 SUBPOPULATIONS; ONLY WHITE-FLOWERED
 PLANTS OBSERVED.

 COMMENTS: VOUCHER-SCHASSBERGER, L.A. (204). 1988. MONTU.

 MACODE1: PRIVATEOWNMTUS CONTAINED1: N MACODE2: FFSNFDEER4MTUS CONTAINED2:
 N
 MACODE3: CONTAINED3: ADLMAS: MORELAN: MOREPROT:
 MOREMGMT: SITECODE:
 SITENAME:
 OWNER: PRIVATE; DEERLODGE N.F.
 OWNERCOMM:
 PROTCOMM:
 MGMTCOMM:
 MONITOR: MONITORNUM:
 BESTSOURCE: SCHASSBERGER, L.A. 1988. FIELD SURVEYS IN JEFFERSON,
 MADISON, SILVER BOW AND BEAVERHEAD COUNTIES, 5-9 JUNE.
 SOURCECODE: F88SCH03MTUS PNDSCH02MTUS S88SCHUMMTUS

 DATASENS: N BOUNDARIES: Y PHOTOS: Y OWNERINFO:
 TRANSCRIBR: 88-12-13 LAS CDREV: Y MAPPER: 88-12-13 LAS QC: N
 UPDATE: 88-12-14 JSS

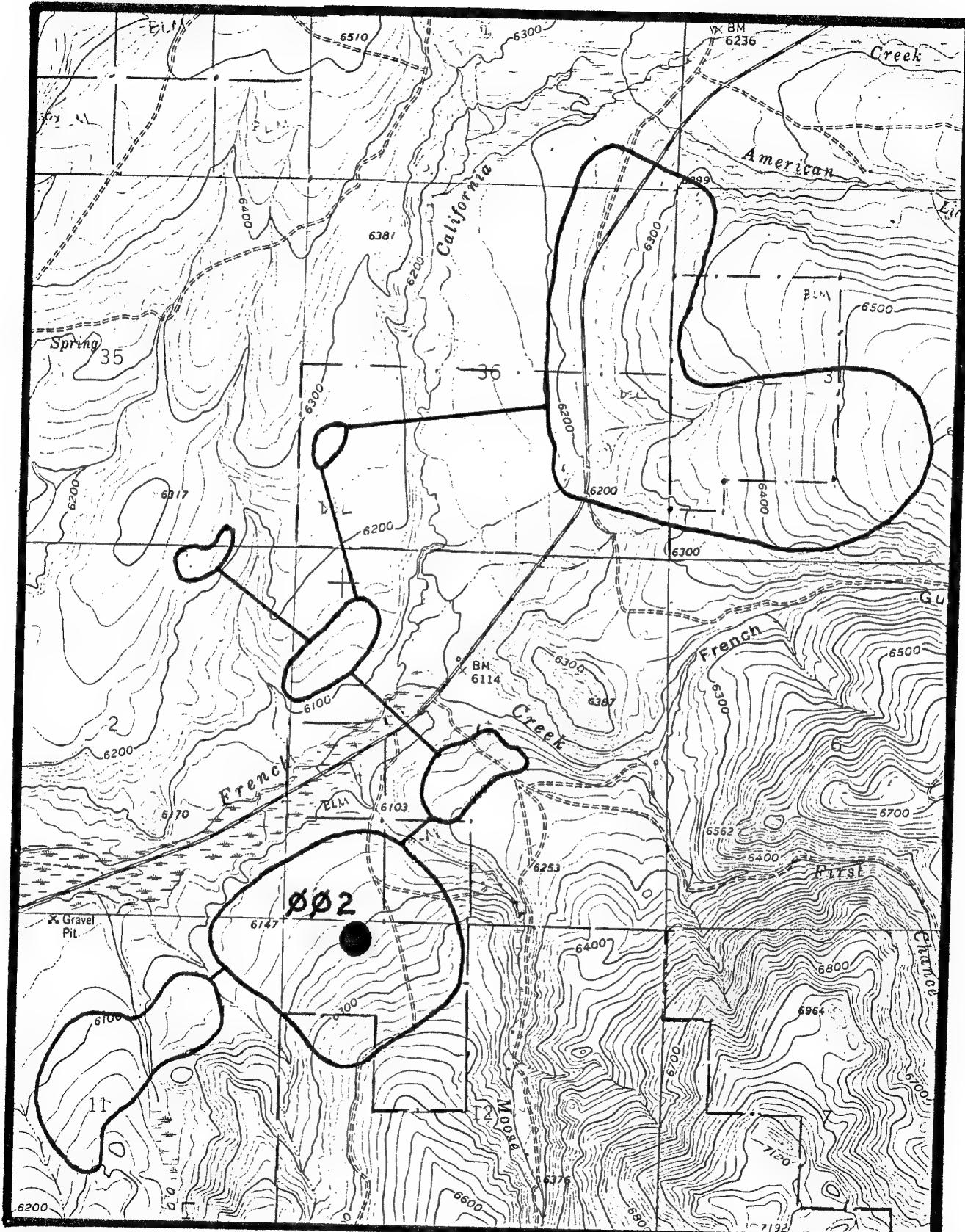
MONTANA



USGS Butte North Quadrangle (15')

Claytonia lanceolata var. flava

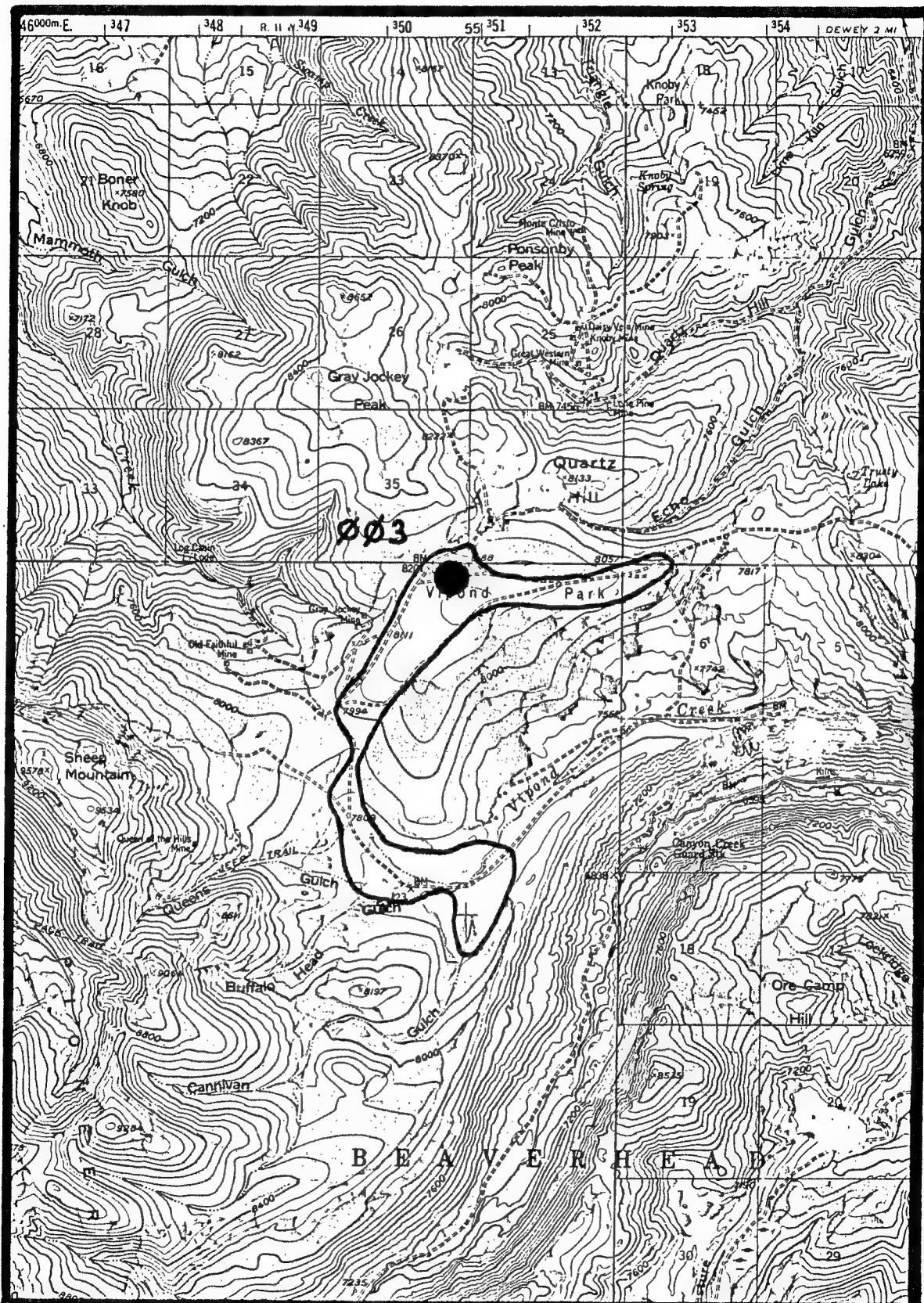
MONTANA



USGS Lincoln Gulch Quadrangle (7.5')

Claytonia lanceolata var. flava

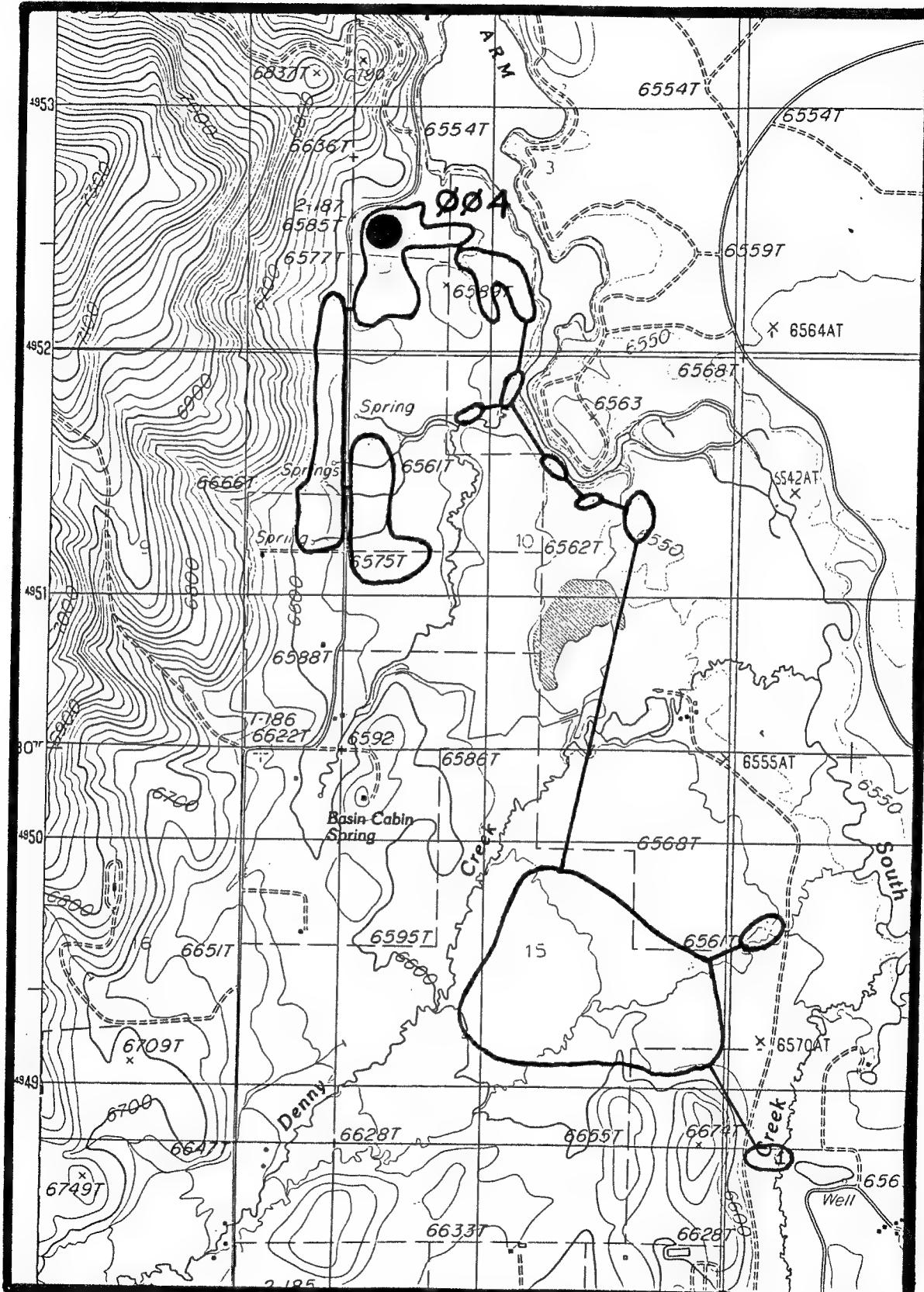
MONTANA



USGS Vipond Park Quadrangle (15')

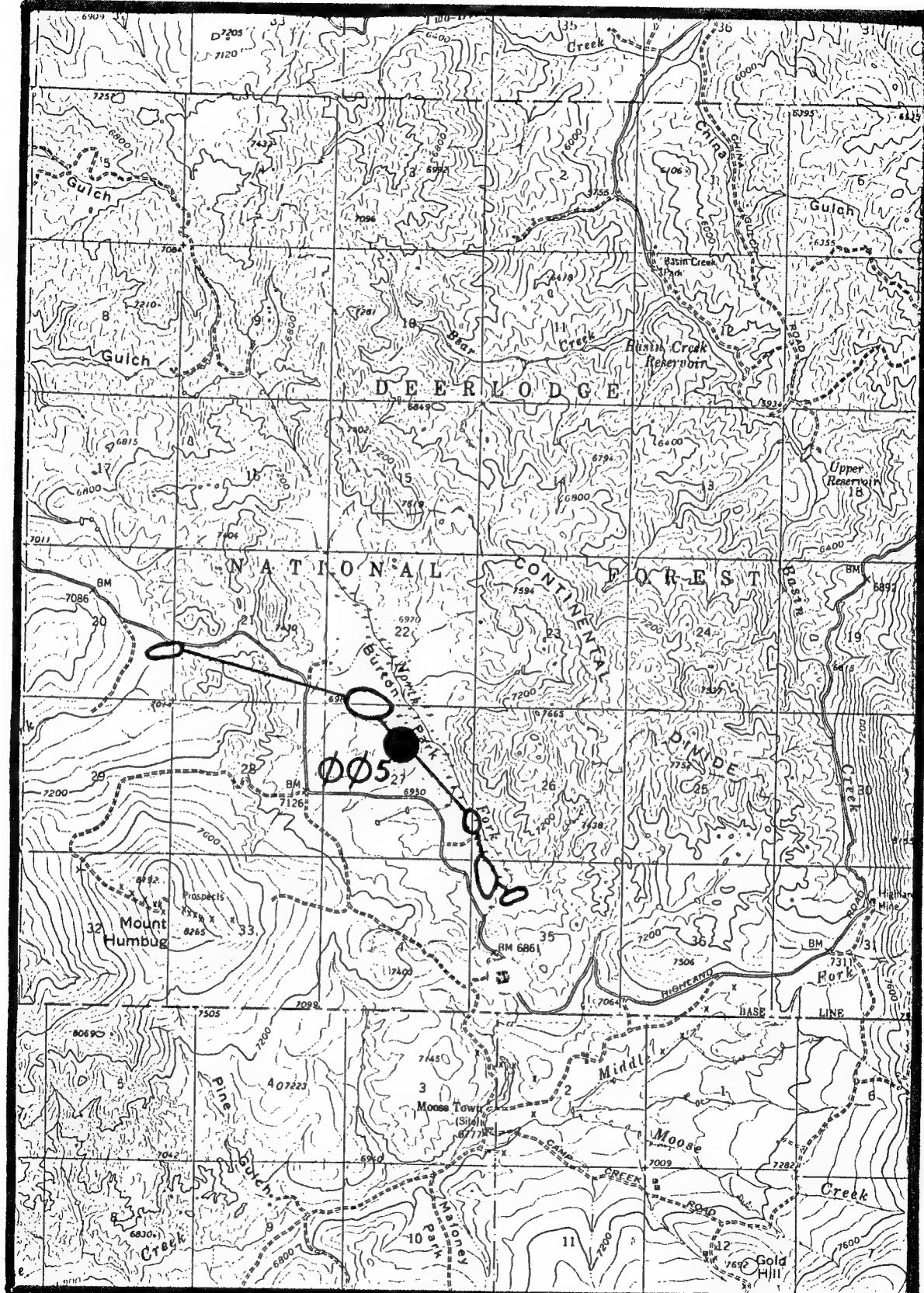
Claytonia lanceolata var. flava

MONTANA



USGS Madison Arm Quadrangle (7.5')

Claytonia lanceolata var. flava



USGS Butte South Quadrangle (15')

Claytonia lanceolata var. flava

V. PHOTOGRAPHS (PP. 33-40)



A. Claytonia lanceolata var. flava - yellow-flowered individual (Hebgen Lake (004) site).



B. Claytonia lanceolata var. flava - white-flowered individual (French Creek (002) site).



C. Claytonia lanceolata var. flava - cluster of yellow-flowered individuals (Lockhart Meadows (001) site).



D. *Claytonia lanceolata* var. *flava* - white- and yellow-flowered individuals growing together; note dense associated vegetation (French Creek (002) site).



E. Claytonia lanceolata var. flava - habitat; plants occur in grassy swales (Hebgen Lake (004) site).



F. Claytonia lanceolata var. flava - habitat (Lockhart Meadows (001) site).



G. Claytonia lanceolata var. flava - habitat (Burton Park (005) site).



H. Claytonia lanceolata var. flava - habitat; Anaconda-Pintlar Range in background (French Creek (002) site).

APPENDIX A.

Summary of genetic differences amongst populations of Claytonia lanceolata vars. flava and lanceolata, as determined by electrophoresis (analysis conducted by Dr. Douglas Soltis' laboratory, Department of Botany, Washington State University). Populations are labeled as follows:

1.) Variety flava (yellow and white forms):

Lockhart Meadows (001) - **CHAMPION YELLOW**
CHAMPION WHITE

French Creek (002) - **ANACON YELLOW**
ANACON WHITE

Vipond Park (003) - **VIPOND YELLOW**
VIPOND WHITE

Hebgen Lake (004) - **HEBGEN YELLOW**

Wyoming - **WYOMING YELLOW**
WYOMING WHITE

2.) Variety lanceolata:

Raynolds Pass - **HEBGEN LANCEOL**

French Creek - **ANACON LANCEOL**

Champion Pass - **CHAMPION LANCEO**

Vipond Park - **VIPOND LANCEOL**

Wyoming (Togwotee Pass) - **WYOMING LANCEOL**

PHENOGRAM OF NEI'S GENETIC IDENTITY RELATIONSHIPS
AMONG POPULATIONS OF CLAYTONIA LANCEOLATA

SIMILARITY

0.60 0.67 0.73 0.80 0.87 0.93 1.00

***** HEBGEN YELLOW

 * * * WYOMING YELLOW
 * *****
 * * WYOMING WHITE
 *

 * * ANACON YELLOW
 * ****
 * * * ANACON WHITE
 * **
 * *** *** VIPOND YELLOW
 * ****
 * *** *** VIPOND WHITE
 *
 * * CHAMPION YELLOW
 * ****
 * * CHAMPION WHITE
 *
 * ***** HEBGEN LANCEOL
 * **
 * ***** ANACON LANCEOL
 *

 * * ***** WYOMING LANCEOL
 * *
 * ***** CHAMPION LANCEOL
 *

 ***** VIPOND LANCEOL

0.60 0.67 0.73 0.80 0.87 0.93 1.00

